

REMARKS

Applicant has amended claims 1, 3, 4, 7-14, and 17-22. Claims 23-41 were previously cancelled. Applicant has additionally cancelled claims 5, 6, and 16, and added new claims 42 and 43. Thus, claims 1-4, 7-15, 17-22, 42, and 43 are pending. No new matter has been added.

The Invention

In one embodiment, the present invention relates to unsupported homogeneous catalysts for the production of methanol from synthesis gas. The homogeneous catalysts contain a molecular transition metal complex in combination with a metal alkoxide. Both the transition metal complex and the metal alkoxide in the unsupported catalyst are completely dissolved in a methanol solvent system to yield a two-phase homogeneous system during operation. The two-phase system is formed by the homogeneous catalyst solution in contact with synthesis gas.

The unsupported two-phase catalyst system of the present invention provides faster and more efficient interaction with synthesis gas as compared to unsupported catalyst systems which are slurries or suspensions in a liquid phase. Accordingly, the present invention provides the distinct advantage of significantly decreased reaction times due to significantly increased reaction rates.

Art Rejection Under 35 U.S.C. §102(b)

In the Office Action, the Examiner rejected claims 1-14 and 20-22 under 35 U.S.C. §102(b) for allegedly being anticipated by Marchionna et al. (US 5,238,895). Marchionna relate to catalyst systems containing copper compounds in combination with metal alkoxides.

Applicant does not agree with the Examiner's premise. For example, Marchionna et al. do not anywhere teach or suggest that the copper compounds disclosed therein are homogeneous catalysts as in claims 1-14 and 20-22 of the present application. Nor do Marchionna et al. teach or suggest that the copper compounds disclosed therein, when unsupported, are fully soluble in a methanol solvent system to form a two-phase homogeneous system during operation as in the foregoing claims.

In contrast, claims 1-14 and 20-22 relate to unsupported molecular transition metal catalysts which are fully dissolved in a methanol solvent system to form a two-phase homogeneous system during operation.

The advantage of using the unsupported homogeneous two-phase catalyst system of the claimed invention is evident in the significantly decreased reaction times as compared to Marchionna. As the Examiner recognized on page 3, end of second paragraph of the Office Action, Marchionna discloses a period of *seven* hours for reaction of the catalyst components to make synthesis gas. In fact, each of Marchionna's examples states that an amount of methanol was obtained after seven hours of reaction time (see, for example, column 4, lines 61-64; column 5, lines 1-4; column 5, lines 14-18; column 5, lines 28-32; and so on).

In contrast, the reaction times of the claimed invention range from about one minute to about thirty minutes (see page 6, lines 10-11 of the application, which is also the subject of amended claim 22). Thus, the reaction times of the claimed invention are on the order of at least fourteen times less than the reaction times disclosed in Marchionna.

However, for the purpose of expediting allowance of the pending claims, Applicant has amended the claims to exclude copper. Specifically, Applicant has amended independent claims 1 and 20 by including the specific transition metals

recited in claim 6 with the exception of copper. Accordingly, as amended, claims 1-14 and 20-22 cannot be said to be anticipated by Marchionna et al.

Art Rejection Under 35 U.S.C. §103(a)

The Examiner has rejected claims 15-19 under 35 U.S.C. 103(a) as allegedly being unpatentable in view of Marchionna et al. (US 5,238,895) in further view of Jackson et al. (US 6,248,796 B1).

Specifically, the Examiner contends that Jackson et al teach certain elements lacking in Marchionna. For example, the Examiner points to the teaching in Jackson of the use of a support (column 2, lines 45-48 of Jackson). The Examiner contends on page 5, lines 10-13 of the Office Action that it would have been obvious for one of ordinary skill in the art to deposit a catalyst on a support such as those listed in Jackson. The Examiner also points to the fact that Jackson disclose the suspension of the catalyst in an inert solvent (column 2, lines 49-51 of Jackson) as well as the use in Jackson of Group 6 metals (column 2, lines 26-28 of Jackson).

It has already been shown above that Marchionna et al do not teach or suggest the claimed invention. As shown below, Jackson et al. also do not anywhere teach or suggest the claimed invention.

For example, Jackson et al. teach a method for production of mixed alcohols by using a slurry of a sulfided nanosized transition metal catalyst selected from Group VI metals (see Abstract and column 1, lines 13-16 of Jackson). In addition, whether the catalyst in Jackson et al is supported or unsupported, the catalyst forms a slurry (see column 2, lines 45-51 of Jackson).

In contrast, rejected claims 15-17 relate to a homogeneous two-phase solution of an unsupported transition metal catalyst.

In addition, the claimed invention relating to catalysts bound to a support, *i.e.*, rejected claims 18 and 19, is also not taught or suggested by Jackson et al. Jackson teaches the use of supported or unsupported sulfided *nanosized* transition metal catalysts. In contrast, the claimed invention relates to supported or unsupported *molecular* transition metal complexes containing coordinating ligands.

Accordingly, as discussed above, Jackson et al. do not remotely teach or suggest the claimed invention. Therefore, Marchionna and Jackson do not separately or in combination teach or suggest the claimed invention. Moreover, the fact that Jackson teaches elements lacking in Marchionna does not render the claimed invention unpatentable.

Thus, the claimed invention is patentable in view of either Marchionna or Jackson or in view of Marchionna in combination with Jackson.

Formality Rejections

The Examiner rejected claim 4 under 35 U.S.C. 112, second paragraph. Claim 4 was rejected for further limiting the phrase “purified synthesis gas” found in the preamble section of claim 1. The Examiner considers the foregoing limitation to not add further life or breath to the claim.

First, Applicant has amended claims 1 and 4 by changing the phrase “purified synthesis gas” to “synthesis gas.” Support for the foregoing amendment is found in, for example, page 5, lines 20-22 and page 7, line 5 of the application. In addition, the following support for the use of purified or non-purified synthesis gas is found on page 7, lines 17-18 of the application: “As a result of the present invention a homogenous catalyst for the production of methanol from purified or non-purified synthesis gas is provided at low temperatures.”


Second, Applicant has moved "synthesis gas" out of the preamble section of claim 1 and into the body of claim 1 by use of a "wherein" clause. Accordingly, Applicant believes that the amendment to claim 4 properly addresses the 35 U.S.C. 112 rejection presented by the examiner.

The Examiner also rejected claim 17 under 35 U.S.C. 112, second paragraph. Claim 17 depends on claim 16. Claim 17 was rejected for lack of antecedent basis by specifying metals outside of the groups of metals specified in claim 16.

Applicant has cancelled claim 16 and amended claim 17 to depend on claim 1. In addition, copper (Cu) has been removed from claim 17. Support for the metals listed in claim 17 is found on page 5, lines 14-16, and page 11, lines 20-22 of the application. Applicant considers the foregoing amendment to properly address the 35 U.S.C. 112 rejection presented by the examiner.

In view of the above amendments and remarks, allowance of pending claims 1-4, 7-15, 17-22, 42, and 43 is earnestly requested. If the examiner has any questions concerning this application, it is respectfully requested that the examiner contact applicant's agent at the telephone number provided below.

Respectfully submitted,



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